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EMERGENCY SURGICAL CONDITIONS FROM THE NURSING  
PERSPECTIVE

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## TABLE OF CONTENTS

INTRODUCTION.....	3
CHAPTER 1. SPECIFIC ASPECTS AND PRINCIPLES GUIDING THE ORGANIZATION OF NURSING CARE IN AN EMERGENCY SURGERY SETTING (REVIEW OF LITERATURE).....	6 14
CHAPTER 2. THE OBJECT OF RESEARCH AND METHODS OF STUDY	15
CHAPTER 3. NURSING CARE IN BALLISTIC INJURIES.....	27
CHAPTER 4. NURSING CARE IN VICTIMS OF HOUSEHOLD ACCIDENTS.....	
CHAPTER 5. A STUDY OF THE NEED FOR EMERGENCY SURGICAL TREATMENT IN VICTIMS OF HOUSEHOLD ACCIDENTS AND PATIENTS WITH BALLISTIC INJURIES.....	36
CHAPTER 6. THE PRINCIPLES FOR WORKING WITH PATIENTS IN DANGEROUS NEIGHBORHOODS AND THE RISKS FACED BY MEDICAL PERSONNEL.....	42 50 51
CONCLUSIONS.....	
REFERENCES.....	

## INTRODUCTION

**The background of the study.** Health- and life-threatening medical and surgical emergencies require emergency interventions at all stages of providing medical care to patients [3, 6]. These conditions arise as a result of progressive shock, acute blood loss, respiratory distress, circulatory disorders, coma, etc. The latter conditions are caused by acute disease of internal organs, traumatic injuries, poisonings and accidents [2, 5].

When providing care to acutely ill and injured as a result of emergency situations, adequate prehospital and hospital measures are recognized to have a highest significance. As suggested by the evidence, a significant number of patients and accident victims can be rescued on condition of timely and effective treatment at both the prehospital and the hospital stages [4, 7].

Nursing personnel play a pivotal role in the provision of emergency care. The roles of nurses are very significant and include multiple components, beginning with care at admission and through the end of the patient's hospital stay [13, 16]. Surgical operations are an indispensable part of emergency care, since very often it is impossible to save human life without a surgery. This is especially true of victims of accidents, ballistic injuries or household trauma [1, 14].

**The aim of the study** was to investigate the specific aspects of nursing process as applied to emergency surgery in patients with ballistic injuries and household trauma, to determine the risks faced by medical personnel when working with patients in dangerous neighborhoods, to identify nursing strategies in managing aggressive patients, and to define the need for surgical interventions in ballistic injuries and household trauma as part of a research study.

### **Study objectives.**

1. To investigate the specific aspects of nursing process in emergency surgery.

2. To investigate the specific aspects of treatment in patients with ballistic injuries.
3. To define the need for surgical interventions in ballistic injuries.
4. To study the treatment methods used in patients admitted with household trauma.
5. To define the need to perform surgical procedures for household trauma in emergency patients.
6. To identify the risks associated with nursing work in dangerous neighborhoods.
7. To determine the principles for working with aggressive patients.
8. To identify and compare the need for surgical interventions in patients admitted with household trauma and ballistic injuries.

**The object of research.** Patients with household trauma and ballistic injuries who required emergency surgical treatments and who received both medical and surgical treatment.

**The subject of research.** The role of nursing process in emergency surgery and the need for surgical interventions in household trauma and ballistic injuries.

**The methods of study** included the following: general clinical assessment (general medical and general surgical methods, special surgical methods); forensic methods; history of present disease and health history; patient observation, physical examination, general health assessment; data comparison and data analysis, laboratory and imaging tests; a comprehensive analytic method; and statistical methods of a research study.

**The scientific and practical value of the study.** During analysis of information about the work of nursing personnel with emergency patients and the need for surgical interventions, the author has determined a set of basic principles to guide treatment, diagnosis and communication with emergency patients. This research study has also identified key factors in diagnosis and

treatment of ballistic injuries and household trauma, potential risks and specific aspects of nursing work with aggressive patients or their accompanying persons and specific aspects of work in high-crime (dangerous) neighborhoods. The research study has identified the strategies for management of the aforementioned patients and compared the numbers of patients with ballistic injuries and household trauma who required surgical treatment. This information will help healthcare professionals improve the treatment and rehabilitation of these patients, and will provide behavioral guidelines for personnel working in emergency departments, especially when such healthcare facilities are located in high-crime/dangerous neighborhoods.

CHAPTER 1  
SPECIFIC ASPECTS AND PRINCIPLES GUIDING THE ORGANIZATION  
OF NURSING CARE IN AN EMERGENCY SURGERY SETTING  
(REVIEW OF LITERATURE)

Surgical nurses are an important component of the surgical/trauma team and provide wholesome patient care before, during, and after surgery. In order to be prepared for work in the surgical setting, they will need special skills and knowledge. Surgical Nursing is a highly sought after specialization. A nurse with a special training in preoperative care may assist surgeons and nurse practitioners during the procedures. These nurses usually work directly with the doctor and provide care to specifically assigned surgical patients; the role of such nurses is to ensure a smooth postoperative period (as much as it depends on them) [9, 18].

There are many types of preoperative specialties that a registered nurse can pursue, and all of them are critical to successful surgical outcomes [8, 11].

Surgical nurses may be trained in additional specialties to enable them to work with specific patient populations and surgeons. They may work directly with emergency patients in the fields of Surgery, Neurosurgery, Pediatrics, Oncology, or in many other areas of highly specialized care [10, 21].

Premedical first aid is a set of emergency interventions, which are required prior to further qualified medical care. Every individual should be able to provide premedical first aid in various accidents and situations. Increasing automation and mechanization of manufacturing processes, being overall positive and providing a beneficial influence on economy, may occasionally have adverse implications for human health and life, such as accidents, household trauma and occupational, i. e. work-related injuries [22, 23].

First aid is a set of simple and expedient interventions to preserve life and/or health in a victim of an accident or an acute disease. Properly performed

first aid reduces the time of specialized treatment, contributes to faster wound healing; quite often, it wins the decisive time to save the victim's life [28].

First aid must be provided immediately at the scene of the accident. It should be prompt, skillful and done before the doctor arrives or before the victim is transported to a healthcare institution. For the premedical first aid to be effective and timely, all work areas should have a first aid kit complete with the listed medical appliances and drugs and periodical first aid training and drills should be performed with the employees [2, 27].

Premedical nursing care in emergencies is a primary health care provided to a patient (victim) when no physician is currently available. This type of care is provided by a health professional with a nursing degree (trained and licensed to practice Nursing) in accordance with technologies of premedical care in emergency conditions [12, 18].

When no treatment by a physician is available in a medical or surgical emergency, the nurse should be able to assess the patient's condition independently and to provide premedical care according to the protocol approved for this emergency. Acting outside a healthcare facility, the nurse will use a "Premedical Emergency Kit" or improvised resources. When in a healthcare facility, the nurse will use a "Healthcare Facility Emergency Kit"; after calling the ambulance or a doctor, the nurse will not interrupt providing care to and monitoring the patient until the ambulance and/or doctor arrive(s). When a nurse provides emergency medical care, an accurate diagnosis it is not always possible to be made [15, 17].

This is due to a variety of diseases associated with emergency conditions, time deficits for decision-making and limited resources used by a nurse/midwife. Therefore, premedical care in emergency conditions should be based on the prevailing syndrome found when examining the patient [30, 24].

Premedical first aid includes the following:

- immediate removal of the influencing hazardous factor;

- provision of premedical first aid;
- calling an ambulance or organizing delivery of the victim to a healthcare institution.

The overall algorithm of nursing actions in an emergency is as follows:

- Assess the condition of an adult patient or a child (as moderate, severe, extremely severe).
- Identify the leading syndrome that determines the severity of the patient's condition.
- Monitor vital signs.
- Carry out interventions as approved by the applicable protocols.

When providing first aid, it is necessary to adhere to a predefined sequence and use a quick and correct assessment of the victim's condition. All actions should be expedient, well-considered and resolute, and performed in a prompt and calm fashion [6, 11].

First of all, the nurse will need to quickly assess the circumstances of the accident and to take measures to stop the traumatizing factor if still in progress (i. e. disconnect electrical power supply, etc.). It is necessary to assess the condition of the victim promptly and correctly and to determine how circumstantial data are important for subsequent care. This is especially important if the patient is unconscious. When inspecting the victim, the nurse will determine if the victim is still alive and will assess the type and the severity of injury [1, 7].

After that, without wasting time, the nurse will proceed to premedical first aid and will call an ambulance or organize transportation of the victim to the nearest healthcare institution without leaving the patient unattended [29].

Identifying vital signs.

In case of a severe injury, gunshot wound, electric shock, drowning, suffocation, poisoning, etc. loss of consciousness may occur, i. e. the state when the victim lies motionless, does not answer questions and does not respond to



stimuli. This occurs as a result of impaired activity of the central nervous system (mainly that of the brain, the center of consciousness) [20, 25].

The care provider should clearly and quickly distinguish loss of consciousness from death. If minimal signs of life are found, it is necessary to initiate premedical first aid immediately and, first of all, make attempts at resuscitation.

The presence of vital signs signals the need for immediate resuscitation.

It should be remembered that the absence of heartbeat, pulse, breathing and pupil response to light does not necessarily mean that the person is dead. A similar set of symptoms can be observed in clinical death, where it is necessary to provide the victim with an immediate full program of resuscitation [10, 13].

Clinical death is a short-term transitional stage between life and death; its duration is only 3 to 6 minutes. Breathing and heartbeat are absent, the pupils are dilated, the skin is cold and no reflexes are present. Within this short period, it is still possible to restore vital functions with the help of artificial respiration and chest compressions (collectively referred to as cardiopulmonary resuscitation or CPR). At a later time, irreversible processes occur in cardiac and cerebral tissues and clinical death becomes what is referred to as biological death [26].

Obvious signs of death, when any attempts at resuscitation are pointless, include the following:

- dimming and drying of the cornea of the eye;
- cooling of the body and the appearance of cadaveric spots (blue-violet spots on the skin);
- rigor mortis. These indisputable signs of death begin to appear 2–4 hours after death.

After assessment of the victim's condition, vital signs or signs of clinical death, the nurse will proceed to premedical first aid. The scope of premedical first aid depends on the type of injury, the degree of damage and the condition of the victim [17, 22].

When providing first aid, it is important not only to know how to provide it, but also to be able to handle the victim properly in order to avoid any additional injury.

Cessation of cardiac activity may be due to a variety of causes, e.g. electric shock, poisoning, heat stroke, etc.

In any case, the care provider has only 3 to 6 minutes to identify the problem and to restore blood supply to the brain.

There are two types of cardiac arrest: asystole or true cardiac arrest, and ventricular fibrillation, when individual fibers of the heart muscle contract chaotically, in an uncoordinated fashion. However, in both cases, blood circulation stops, so the clinical implications for the patient are identical [16, 28].

The main symptoms of cardiac arrest, which aid quick diagnosis include the following: loss of consciousness, pulselessness (including lack of pulse in the carotid and in the femoral arteries); respiratory arrest; pallor or blue discoloration of the skin; dilated pupils; and convulsions that may appear at the time of loss of consciousness [27].

If these symptoms appear, the nurse should immediately start chest compressions and artificial respiration (cardiopulmonary resuscitation). It should be remembered that chest compressions are always performed along with artificial respiration, as a result of which the circulating blood is saturated with oxygen. Otherwise, resuscitation is pointless.

First aid for bleeding. The danger of injuries accompanied by damage to blood vessels is well known. The victim's life often hangs on how skillful and prompt the first aid is.

Bleeding can be either external or internal. Depending on the type of the damaged blood vessels, it may present as arterial, venous or capillary bleeding [17, 23].

Arterial bleeding is the most dangerous type of bleeding. In this case, a bright red (scarlet) pulsating jet of blood is seen spurting in time with cardiac contractions. When a major arterial vessel is injured (e.g. carotid artery, brachial artery, femoral artery, aorta, etc.), the rate of bleeding is so intense that within a matter of minutes the victim may literally bleed to death.

A tourniquet is applied to the shoulder, forearm, lower leg or thigh, and at all times above the bleeding site. In order to minimize skin damage, the nurse may need to place a piece of cloth under the tourniquet or place the tourniquet over the patient's clothes, smoothing out the folds. Usually, the tourniquet is wrapped 2-3 times around the limb and then tightened until the bleeding stops [30].

If the tourniquet is applied correctly, no blood vessel pulsation should be detected below (distally from) the tourniquet. However, care should be taken not to tighten the tourniquet too much, since this may damage the muscle and the nerves, leading to limb paralysis or even necrosis.

It should be remembered that the tourniquet may be left in place for no more than 1.5 to 2.0 hours during the warm season, and for not more than 1.0 hour in cold season. If the tourniquet is left in place for a longer period, there is a danger of tissue necrosis. Therefore, the nurse or other care provider should place a note under the tourniquet or pin it to the clothes near the tourniquet with the date and exact time the tourniquet was applied (in a 24-hour format) [16, 24].

If it is necessary to keep the tourniquet in place for longer than above, the nurse should press against the vessel above the wound with their thumb, then remove the tourniquet, wait for 10-15 minutes with the finger in place, then reapply the tourniquet to a slightly lower or higher position.

To quickly stop the bleeding, one may press the artery in conventional locations, above the site of injury.

It is also permissible to temporarily stop the bleeding by fixing the injured limb in a certain position, thereby squeezing the artery if possible. For instance,

if a subclavian artery is injured, have the patient pull their hands behind their back as much as they can and fix them at the level of elbow joints. By flexing the limbs as much as possible, it may be possible to compress the popliteal, femoral, brachial and ulnar arteries.

After arterial bleeding has been stopped, it is necessary to take the victim to a healthcare institution as soon as possible.

Bleeding is the outflow of blood from blood vessels when their integrity or permeability of their walls is impaired. Distinctions are made between traumatic bleeding caused by direct mechanical damage to the vascular wall (incision, rupture, shock, compression, crushing, etc.), and non-traumatic bleeding caused by abnormal changes in the vessels or in the surrounding tissues (arrosion, dissection) seen in atherosclerosis, syphilis, malignant tumors, purulent inflammation, etc. Non-traumatic bleeding can be caused by disease and abnormal conditions, where blood clotting is impaired (jaundice, blood diseases, certain poisonings, sepsis, vitamin deficiencies) [28].

The bleeding may be external or internal. External bleeding is characterized by an externally visible outflow of blood through damaged skin or damaged mucous membranes. In case of internal bleeding, blood is entering a body cavity (pleural, abdominal or cranial cavity) or the lumen of a hollow organ, i. e. the stomach, the intestines, the urinary bladder, the uterus, the bronchi or the trachea. Internal bleeding also includes hemorrhages into the subcutaneous fat, between muscles and between aponeurotic sheets. As a result, hematomas are formed [[17].

Unlike external bleeding, internal bleeding is not always easy to diagnose. Signs of internal bleeding include the following:

- pallor of the skin and mucous membranes;
- cold sweat;
- escalating anxiety;
- dizziness;

- drowsiness;
- yawning;
- thirst;
- loss of consciousness.

Notable signs include collapse or vasogenic shock (with increased heart rate and weakened pulse, and a sharp drop in blood pressure) and a decrease in hemoglobin. Internal bleeding may be a cause of death even in a relatively small blood loss, when vital organs (heart or brain) are subject to compression by the extravasated blood [12, 19].

In case of nasal bleeding (epistaxis), the patient should be laid down or seated with their head slightly tilted back. Unbutton the collar, place a cold pack on the bridge of the nose, insert a piece of sterile cotton wool or gauze dipped in hydrogen peroxide into the nostril and squeeze the soft parts (wings) of the nose with fingers [16, 23].

The knowledge of these principles will help the nursing staff to provide timely responses in emergency situations [26]. In emergency care, a timely diagnosis of the disease or a type of emergency and an immediately initiated treatment are playing a very important role.

## CHAPTER 2

### THE OBJECT OF RESEARCH AND METHODS OF STUDY

The object of the study included patients with emergencies resulting from ballistic injuries and household trauma, who were admitted to a surgical department of a multifunctional hospital to be provided with emergency care. At the same time, we studied the special aspects in organization of nursing work with emergency patients and compared the need for surgical interventions depending on the type of injury.

The causes for emergency room admissions, provision of medical care and therapeutic approaches have been informed by comprehensive assessment protocols. The author has used general clinical assessments, forensic methods, collected data on history of present disease, took into account general health history and psychological status of the patients, physical examination data, general health assessments, collection of information on main complaints laboratory and imaging tests, and comparative, analytical and statistical methods.

The study consisted of patient observation and data analysis.

The first part of the study enrolled 96 patients, where the author analyzed the numbers of patients with emergencies admitted as a result of household trauma (58 patients) and ballistic injuries (38 patients), and where optimal treatment strategies have been identified in all cases:

Group 1: patients in need of urgent surgical care (this group included 68 patients).

Group 2: patients with an emergency admission and in need of medical treatment (this group included 28 patients).

In the second part of the study, the author has analyzed the risk factors that health care personnel is exposed to when working with aggressive patients and/or in dangerous (high-crime) neighborhoods.

As a conclusion of the research work, analysis and data comparison, generalization and inferencing have been carried out.

## CHAPTER 3

### NURSING CARE IN BALLISTIC INJURIES

One of the types of emergency care as part of the work of a nurse includes emergency care for ballistic injuries. In some healthcare institutions, injuries of this type are very rare or almost never seen, while in other healthcare facilities, ballistic injuries that require emergency care are quite common, especially if the facility is located in a high-crime urban neighborhood.

In Europe, firearms became widely adopted in the middle of the XIV century and since then have been widely used in hostilities.

For decades, national criminal laws throughout the world have prohibited unauthorized manufacture, possession, use and trade in firearms. In this connection, ballistic injuries have been relatively rare in peacetime. Recently, as a result of armed regional conflicts, significant deterioration of crime, lax discipline in certain army units of some countries, or due to a number of other reasons, a certain significant part of the population has gained access to firearms, which has created preconditions for its illegal use. Firearm possession is no longer a rarity.

Having a sufficiently high firepower, small arms (i. e. hand firearms) pose an extreme danger to the life and health of people. Multi-shot automatic weapons may kill many people within a short period of time. All of this creates an undoubted public danger of incidents involving the use of small arms, and is a reason for conducting an inquiry prescribed by law.

The instantaneousness of incidents involving firearms, even when witnesses are available, in most cases does not allow reproducing a true picture of the crime without the involvement of a forensic expert. That is why ordering a forensic medical examination of ballistic injuries is a mandatory investigative action, and the results of expert assessments often become decisive sources of evidence in such investigations.



A firearm is defined as a weapon where the kinetic energy of gunpowder combustion is used to eject a high-speed projectile from the bore. It is divided into artillery and small arms. Small arms are group and individual (or handheld). The damage resulting from an explosion of various explosive substances or explosive devices is referred to as explosive injury.

In forensic practice, gunshot injuries (ballistic injuries) are chiefly inflicted by shots from hand weapons. These weapons are divided into combat grade firearms (rifles, carbines, machine guns, pistols, revolvers), hunting firearms (smooth-bore, rifled and combined), sports firearms (small-bore rifles, pistols and revolvers), special purpose firearms (signal flares, starting pistols) and makeshift or modified firearms (including sawn-off shotguns).

Firearms are also classified according to their intended purpose (i. e. as combat-grade, hunting, sports firearms); by their design (rifles, machine guns, carbines, pistols, revolvers); by the reloading method (non-automatic, semi-automatic, automatic); by the length of the barrel (short-barrel [pistols and revolvers], medium-barrel [assault rifles] and long-barrel [rifles, guns]), by the number of barrels (one-, two-, multi-barreled); by the bore characteristics (rifled, smooth-bore, combined); by the number of charges (single-charge, multi-charge); by the mechanism of the shot (incendiary and pneumatic); and according to the manufacturing method (factory made or improvised).

Once fired, the bullet has an enormous kinetic energy. The velocity of the bullet is the principal factor that determines its kinetic energy, since kinetic energy is proportional to the square of velocity. Depending on the magnitude of kinetic energy and the speed of the bullet, there are 4 main types of damage that bullets causes in the human body:

- bursting
- penetrating
- wedge-shaped
- contusion

The bursting or hydrodynamic force of a bullet is seen when the bullet has a very high kinetic energy, at speeds of 500-1000 m/s. The bursting effect involves a radius of tissue destruction much larger than the size of the bullet. As the bullet enters the body, it destroys tissues in its path, creating a permanent linear cavity. However, the impact energy is dissipated as a shock wave that pushes surrounding tissue away from the projectile path in radial fashion, creating a cavity much larger than the size of the bullet. This is referred to as the temporary stress cavity. The bursting action of a bullet is mostly manifested when it enters the liquid or semi-liquid media in the body (e.g. the brain, a filled urinary bladder, a stomach filled with food, the heart during diastole, etc.). Due to the fact that such media are virtually incompressible, they transfer the energy of the bullet in all directions with the same force, thereby contributing to the formation of numerous and spacious ruptures. For example, this may lead to complete destruction of the head with loss of brain matter and bone.

The bursting force of a bullet may also occur when the integrity of the shell of the bullet is impaired, as well as when the bullet travels along an irregular path, losing balance and turning over in the air (for example, as a result of a bouncing/rebounding shot or when the bullet is fired from a sawn-off shotgun).

The penetration force of a bullet is manifested when its speed is a minimum of 250-300 m/s. Such a bullet knocks out a part of tissue in the target, forming damage with the loss of part of the substance, that is, a tissue defect. The knocked-out shredded tissue is removed along with the bullet.

For example, small particles of skin and bone fragments knocked out by the bullet from the entry aperture can be found in brain matter along the wound tract (i. e. in the permanent cavity). The wedge force of the bullet occurs when the kinetic energy of the bullet is insufficient to knock out a piece of tissue and to create an aperture. This is observed in cases when a bullet hits a person's clothing or body at a velocity of 100-150 m/s. The bullet only expands the tissue,

that is, acting like a wedge. The gunshot wound is slit-shaped; no tissue defect is formed.

The contusion effect of the bullet occurs when its kinetic energy is insignificant, i. e. when the bullet has spent its force, and when the impact tissue is dense. In such cases, the bullet acts as a thrown blunt object, forming abrasions or bruises on the body, sometimes a superficial wound. The wound in this case is an impact injury.

The contusion effect is also typical for a bullet that has penetrated the body and, having spent a substantial proportion of its kinetic energy, has encountered the bone. In this case, the bullet may stop without damaging the bone or forms only a crack in the bone.

Every gunshot wound is a contaminated wound. This means that the contents of the wound tract always contain microorganisms that are introduced into the wound at the time of injury with a shell fragment or with scraps of clothing. Microorganisms may penetrate the wound at any other time, i. e. when the bandage is loose or when it gets wet. The quantitative and qualitative composition of microbial contamination is very diverse; it is currently understood to include associations of cocci (*Staphylococcus*, *Streptococcus*), bacteria (*E. coli* and *Pseudomonas aeruginosa*, *Proteus*) and non-clostridial anaerobes (*Bacteroides*, *Fusobacteria*, *Peptococci*, *Peptostreptococci*, etc.). Thus, anaerobic microbes are quickly destroyed in wide open, well-aerated wounds, and the coccal flora subsequently develops. On the contrary, in wounds with a complex fragmented wound tract, favorable conditions are created for the development of anaerobic microflora.

In cases when natural bodily defenses are unable to localize and suppress the wound microflora, an infectious process occurs; in other words, an infectious complication of a gunshot wound develops.

In maritime warfare, when naval weapons are used, ballistic injuries have certain distinctive features. First of all, these features include the predominance

of shrapnel and explosive ballistic injuries due to the impact of fragments of missiles, torpedoes, artillery shells, aerial bombs and sea mines. Bullet wounds are rare in naval warfare. The wounds are often complex and combined in nature; they are distinguished by extensive damage zones and a complicated wound tract.

Naval forces, namely combat divers, may use special firearms, such as APS underwater assault rifle and SPP-1 underwater pistol capable of striking enemy personnel in an aquatic environment, where the use of conventional firearms would be impossible. Due to its significant mass (20 g) and length (12 cm), the arrow-shaped bullet projectile of such a weapon is highly lethal under water, maintaining deadly force at distances of up to 30 m. These projectiles cause typical "low velocity" ballistic injuries. The cavitation effect in such injuries is low.

Therefore, the following characteristic features of ballistic injuries should be considered during their treatment:

- a wide variety of projectiles and damage factors;
- characteristics of tissue defects in the area of the wound tract;
- irregularity of tissue damage in the area of the wound tract and the complex structure of the wound tract;
- damage to tissues and organs beyond the wound tract;
- microbial contamination of the tissues in the gunshot wound;
- frequent development of purulent complications;
- pronounced general responses of the body to ballistic injuries.

The treatment of ballistic injuries begins at the forefront of medical evacuation. At the scene (battlefield, combat position of a naval vessel), before the wounded are taken to the stage where qualified/specialized medical care is possible, the following measures must be taken:

1. Application of aseptic dressing (which protects the wound from pollution and adverse environmental factors and adsorbs wound detritus);
2. Temporary arrest of bleeding;
3. Transport immobilization to create the maximum possible functional rest and to prevent additional tissue trauma during the evacuation;
4. Use of broad-spectrum antibiotics (enteral or parenteral in first pre-medical aid; infiltration of tissues around the wound with antibiotics during primary medical care).
5. Parenteral analgesic administration using a syrette.

These primary measures are aimed at preventing shock and wound infection. Often, only by using the aforementioned methods it is possible to create favorable conditions for further healing and uncomplicated course of ballistic wounds. According to the data from local conflicts in recent decades, 25% to 40% of ballistic injuries do not require primary surgical debridement. Such injuries include perforating wounds of soft tissues inflicted by projectiles with low kinetic energy; multiple non-perforating wounds caused by small fragments, arrow-shaped and needle-like projectiles (provided that there is no damage to the bones, neurovascular bundles and when penetration has been ruled out). Such wounds are treated with watchful waiting, which includes drainage and preventive antibiotic therapy.

In cases where there are signs of significant de-vitalization of tissues, damage to bones, blood vessels and internal organs, a surgical treatment is required. This treatment restores normal anatomical relationships and removes the potential substrate for infectious process.

Debridement is the fundamental method of treatment for ballistic injuries. Debridement of a gunshot wound is a surgical intervention aimed at preventing the development of infectious complications and at creating favorable conditions for uneventful wound healing. Primary debridement is the first surgical

intervention performed for the primary indication, that is, for the tissue damage per se. The indications to debridement of a gunshot wound are determined by the nature of the wound, by the general condition of the wounded person, and by the current threat environment and medical situation.

Optimal treatment outcomes of ballistic injuries and the lowest incidences of purulent complications are seen when primary surgical debridement is performed as soon as possible from the moment of injury. The entire system of medical evacuation and medical support for the wounded during combat is aimed at reducing the time to primary surgical debridement. The primary surgical debridement performed within 24 hours since injury is referred to as early debridement; the one performed within 24 to 48 hours is referred to as delayed debridement. If primary surgical debridement is performed later than 48 hours since injury, is referred to as late debridement.

Every ballistic injury requires an individualized surgical approach. The extremes to be avoided include excessive radicalism (when the operation by itself may become more traumatic and more dangerous than the injury) and inadequate surgical treatment (when tissues with irreversible changes may remain in the wound).

It is necessary to make every effort for wound debridement to be comprehensive and one-step. However, this requirement is not always feasible. Implementing the principle of exhaustive debridement can be achieved through early specialized surgical care. At the stage of qualified care, primary surgical debridement of cranial and cerebral wounds should be avoided, and debridement of ballistic bone fractures should only be performed in situations of damage to major blood vessels, wound contamination and extended soft tissue damage. At the stage of qualified care, interventions are usually performed for urgent and emergency indications. In a setting of well-organized medical evacuation, the rest of the wounded persons will receive primary medical care in full.

At the stage of specialized care, primary surgical debridement is performed in all the wounded. In any case, primary surgical debridement should be performed on condition that the wounded person is no longer in shock. In the presence of a bleeding, specialized surgical care is performed in parallel with anti-shock interventions.

As a surgical intervention, primary surgical debridement includes the following 6 stages:

The first element of surgical debridement is the dissection of the wound, without which it is impossible to perform a full revision and access the damaged structures. Dissection of the wound pursues yet another goal: to reduce the negative effects of traumatic edema on the tissues and the likelihood of expansion of late necrosis. This element of primary surgical debridement is especially important in those anatomical areas where muscle tissue is enclosed in dense connective tissue fibrous sheaths.

The second stage includes the removal of foreign bodies (projectiles and their fragments, secondary projectiles, scraps of clothing and shoes, free-lying bone fragments and blood clots). At the stage of qualified care, the surgeons may remove foreign bodies only along the wound tract. This stage does not include removal of foreign bodies located in the vicinity of major blood vessels, in the depth of vital organs and if such removal would require a complex additional surgical access.

The next element of the primary surgical debridement is the excision of devitalized tissue. In course of debridement, all “blind” pockets should be opened wide and revised. All bleeders should be controlled and inspected for hemostasis. Devitalized, crushed and contaminated tissue should be excised. Tissue excision should be performed in layers; the surgeon should be taking into account the different responses of various tissues to a gunshot injury. The skin and the fasciae are cavitation-resistant and are therefore excised sparingly. Muscles are prone to damage to the greatest extent. The surgeon’s judgment on

the limits of tissue to be excised is guided by the generally accepted criteria of viability (also known as “the rule of four Cs”):

- criterion of bleeding (viable tissues bleed well if damaged);
- consistency (viable tissues have a characteristic consistency, which is distinctively different from that of necrotic tissue);
- contraction (viable muscle tissue will contract with mechanical stimulation);
- color (viable tissues have a characteristic red to pink color).

The next element of surgical debridement is an intervention on damaged organs (i. e. the brain, organs of the chest cavity and abdomen, large vessels, etc.); final arrest of the bleeding is a mandatory element.

The fifth stage of surgical debridement includes draining the wound with PVC or silicone drainage tubes at least 10 mm in diameter. Counter-apertures are applied as required. Two variants of draining are used. The simplest method is passive draining; the most effective method is the continuous flow draining.

A crucial stage is the sixth stage, i. e. the closure of ballistic wounds. In the vast majority of cases, it is not possible to close a gunshot wound after surgical debridement by applying a primary suture. Wounds should be loosely packed with tampons soaked in antiseptic solutions, ointments with water-soluble bases or antibiotic solutions, and covered with a bandage. It is permissible to apply primary sutures in wounds to the face and the hairy skull, in penetrating chest wounds with open pneumothorax, in abdominal wounds, in wounds to the joints, the wrist, the scrotum and the penis. Primary sutures should be applied to the capsule of large joints and when surgical wounds are sutured outside the wound tract (i. e. after laparotomy, thoracotomy and access to blood vessels and large foreign bodies).

Methods of wound closure.

Primary sutures can only be used at the stage of specialized care, subject to the following strictest conditions:



1. Early debridement and absence of any visible contamination or inflammatory changes in the wound;
2. Confidence in sufficiently radical excision of necrotic material and removal of foreign bodies from the wound;
3. Integrity of major blood vessels and nerve trunks;
4. The possibility to converge the edges of the wound without tension;
5. Satisfactory general condition of the wounded person;
6. The ability to monitor the wounded person at a given stage of medical evacuation prior to removal of the sutures.

The most preferred methods of ballistic wound closure include the use of delayed primary sutures and secondary sutures.

A delayed primary suture is applied to the wound 3 to 7 days after the injury and debridement (the surgeon will delay the suturing until granulations appear in the wound). During this time, trauma-induced edema is substantially reduced; the wound is being cleansed due to daily dressing changes and the immediate danger of infectious complications is minimized. An early secondary suture is applied to the granulating wound before scar tissue begins to develop therein (7 to 15 days post-injury). At a later date (15 to 30 days post-injury), the rapprochement of the wound edges is only possible after excision of the cicatricial skin edges. In these cases, late secondary sutures are being referred to. Extensive granulating wounds should be closed by free skin grafting.

In order to increase the efficiency of debridement, auxiliary methods may be used, such as rinsing the wound with antiseptic solutions and with a jet of sterile sea water, active draining, ultrasonically induced cavitation and laser irradiation of the wound, vacuum-assisted and continuous flow rinsing of the wound, use of adsorbents, anti-proteolytic and antioxidant drugs and hyperbaric oxygenation. The therapy aimed at restoring immunological host responses is of great importance. In order to restore homeostasis and improve circulation in the wound area, it is necessary to provide for urgent replenishment of circulating

blood volume and blood loss. The use of rheologically active drugs, antispasmodics and active intensive antibiotic therapy is also important.

Debridement may be performed in connection with the new-onset complications in a previously debrided ballistic wound; this is referred to as secondary debridement. The most common complications include the progression of necrosis and wound infection.

The volume of secondary debridement depends on the nature and the extent of the complications. With the progression of necrosis, excision of non-viable tissues is performed. It should be noted that this type of secondary debridement is considered to be a pathogenetically determined or “pre-programmed” surgical intervention, since progression of necrosis occurs in virtually every ballistic injury.

In the event of infectious complications, the main element of debridement includes the incision and adequate draining of abscesses, cellulitis or purulent leakages. The most extensive secondary debridement is required for anaerobic infection. As a rule, a segment of a limb or a region of the body is dissected, and all fascial sheaths are opened (subcutaneous fasciotomy is a preferred method).

Our study enrolled 38 patients with ballistic injuries. The patients with ballistic injuries in this series were divided into 2 groups:

Group 1 included patients with ballistic injuries who required surgical treatment. This group enrolled 26 patients, which was 68% of a total of 38 patients with ballistic injuries.

Group 2 included patients with ballistic injuries who did not require surgical treatment. This group enrolled 12 patients who were receiving medical treatment, which was 32% of a total of 38 patients with ballistic injuries.

Data analysis has shown that among all patients with ballistic injuries, the majority required emergency surgical treatment.

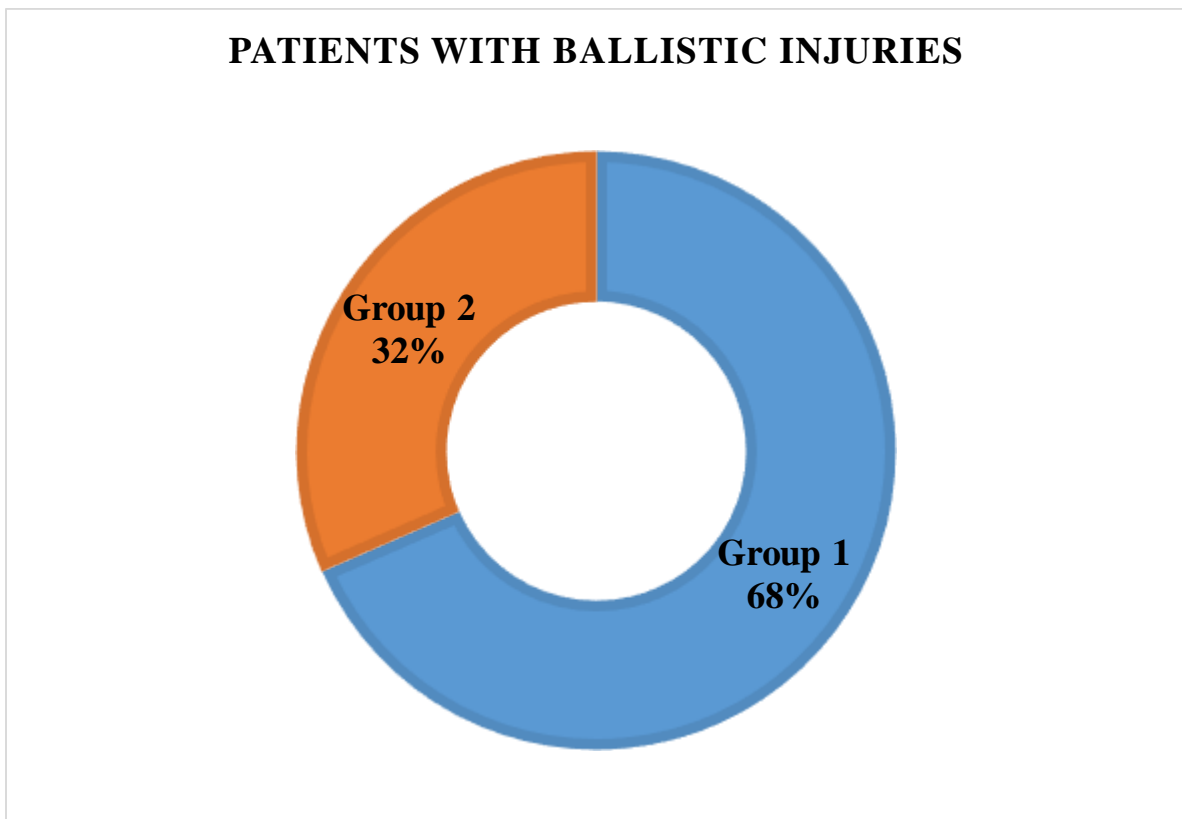


Diagram 3.1. The ratio of patients with ballistic injuries who required emergency surgical interventions to the patients who did not require a surgical intervention.

The strategy in patients with ballistic injuries who did not require surgical treatment included only wound care, watchful waiting and drug treatment.

Apart from specialized nursing knowledge and skills, the nurses who provide care to patients with ballistic wounds should be able to provide first aid in ballistic wounds, including the wounds to the limbs; to know the methods used to stop the bleeding, to know the types of bandages; to know the techniques of immobilization; to have practical skills in injury assessment and triage and to be able to provide emergency premedical aid.

## CHAPTER 4

### NURSING CARE IN VICTIMS OF HOUSEHOLD ACCIDENTS

Nurses working with patients who are admitted to the emergency department after severe or moderate household injuries or work-related injuries should have specialized knowledge and skills of working with such patients.

Household trauma encompasses a group of injuries sustained in various household conditions (falls, injuries sustained while cleaning the house, burns sustained in the kitchen, etc.). The variety of factors underlying household trauma also determines the varying severity of these injuries. However, for the most part, this type of injuries is much lighter than street injuries.

Street injuries include a variety of injuries mainly associated with motor vehicles. However, recently, in connection with changes in the way of life, a larger proportion of street injuries includes such trauma, which essentially identical to combat injuries (knife and ballistic injuries).

A special place among injuries is occupied by sports injuries. They differ from other types of injuries in their specificity and are caused, as a rule, by poor training of athletes or inadequate condition of the equipment they use.

The considerable age-specific aspects of injuries in children make it necessary to single out a special group of pediatric trauma.

Each type of injury has its own characteristic localization and type of damage. In clinical practice, significant attention is paid to the classification of injuries (trauma). The following types of injuries are customarily distinguished:

1. Non work-related injuries (road accidents, household trauma, street injuries). This does not include intentional injuries.
2. Work-related injuries (industrial, agricultural).
3. Intentional injuries.

Regardless of the situation and scene of the injury, the nature and severity of the injury, there is a certain order in which the aid to the victim is provided:

- 1) first aid at the scene of the accident;
- 2) transportation of the victim to a healthcare institution;
- 3) qualified care and subsequent treatment in a hospital or a clinic.

Each injury has its own specific aspects. In clinical practice, a classification of injuries has been adopted to inform selection of therapeutic approaches, assessment of severity of the patient's condition and injury-related prognosis.

It is also important to distinguish between injuries based on the potential for infection in organs and tissues. The issue is the difference between open injuries, i. e. those with impaired skin integrity (i. e. skin and mucous membrane in the damage zone), and closed injuries with no impairment of skin integrity.

Important distinction includes the wounds when the wound tract penetrates into a body cavity (penetrating wounds) or non-penetrating wounds (respectively, without such penetration). A penetrating wound may damage the organs located in the cavity where the wound penetrates.

Whether there is a solitary wound or multiple wounds, is another important characteristic. This parameter should be appended by such a characteristic of the wound as simple wound (when one tissue of the body is injured) and complex wound, when multiple tissues and/or organs in the wound zone are involved.

If tissue damage occurs directly at the site of action of the damaging factor, then such an injury is referred to as direct; and if it is located further from the site of action of this factor, then the injury is referred to as indirect.

The knowledge of the elements to this classification will certainly help the health professional choose an assessment plan, make a correct diagnosis in case of damage, and most importantly, determine the strategy of treatment for the victim.

The clinical presentation of acute trauma is determined by the following:

- the nature of the traumatic factor;
- the physical condition of the victim at the time of the injury;
- the environment where the injury had occurred.

The severity of local manifestations due to injury does not always correspond to systemic changes in the victim's body and vice versa. However, more often than not, there is a fairly good correlation between them. The most frequent phenomena in trauma include syncope, collapse and shock; these are manifest as loss of consciousness of varying duration. Differential diagnosis of these phenomena is important to inform treatment. As for local symptoms in case of damage to organs and tissues, they are different in each type of damage.

Examination of patients with acute trauma should include all the methods used to examine a surgical patient in the clinical setting. These methods include both conventional physical examination methods (inspection, palpation, auscultation and percussion) and complex imaging methods (X-ray, ultrasound, endoscopy, etc.). Selection of the method to examine the patient will certainly depend on the severity of the patient's condition, which may preclude the use of a certain specialized diagnostic modality. However, if this diagnostic modality is critical for decision-making concerning further management of the patient, after prompt but careful benefit/risk assessment this method may need to be used.

An important step of diagnosis in a patient with trauma is collection of trauma history. When collecting the history of trauma, it is important to determine the following:

- the nature of the damaging agent;
- the circumstances when the injury took place;
- time of day when the injury occurred;
- the state of the subject prior to the injury (evidence of alcoholic intoxication at the time of the injury is especially important);
- the general physical well-being of the injured person after the injury;
- if, where and to what extent first aid has been provided to the injured person.

Given the rapid development of local symptoms of the underlying pathologies in the patient, and the potentially severe condition of the patient, the

healthcare professional should promptly recognize and interpret the present symptoms during assessment. In addition, it is very important to be able to determine the mechanism of development for these symptoms.

An especially difficult challenge is faced by healthcare professionals in a disastrous event with massive casualties. In that case they may need to assess the severity and stability of the patients' condition and triage the patients in terms of order of care and/or transportation to healthcare facilities.

When examining a victim after an injury, it is very important to have a clear knowledge of the mechanism of injury and to be able to compare local manifestations of the injury with general condition of the victim. General condition of the victim usually depends on the status of vital organs (the brain and cardiovascular and respiratory systems). When changes are found in these organs, the healthcare professional will need to determine the pathology behind these changes and decide on the ways to improve them. If changes in functions of vital organs are found to be caused by a direct effect of the injurious agent on the organ (i.e. impaired cardiac function in an injury), the abnormal condition of the organ needs to be remedied immediately. If the change in the function of an organ is a complication of an injury, i. e. it occurred as a result of indirect effect on the organ, the medical professional will need to perform a detailed assessment of the victim and take measures to eliminate the conditions that have contributed to impaired function of vital organ(s) (e.g. impaired cardiovascular function due to acute blood loss).

Examination of the site of injury is of great importance for an accurate diagnosis in trauma. By assessment of the mechanism of injury, inspection, palpation, percussion and auscultation, as well as by determining the function of the injured organ, the health professional will likely make a correct conclusion on the nature of the damage, establish a correct diagnosis and begin treatment of the victim.

When inspecting the victim, it is necessary to pay attention to the condition of their skin, to any changes in the shape and configuration of the injured area, as well as to the size and configuration of the examined organ (limb). When a wound is found, it is necessary to determine the type to which it belongs.

Palpation may help determine the presence of pain in the area of injury and identify symptoms characteristic of bone fracture and tissue rupture. A crucially important palpatory finding is the absence of vascular pulsation, which suggests interruption of peripheral blood supply.

Percussion reveals the presence of free fluid in the chest cavity and in the abdominal cavity and determines local tenderness or pain in areas of tissue damage. The data provided by auscultation of the chest suggest the status of pulmonary function and auscultation of abdominal cavity (absence of intestinal peristalsis sounds, i. e. “silent abdomen”) may suggest peritonitis.

Most injuries can be potentially accompanied by serious complications that may lead to an unfavorable outcome of the injury. This is especially dangerous when complications are not detected and/or managed shortly after the injury. When referring to complications of injuries, we need a more clear understanding of what exactly constitutes a complication of injury.

A complication of injury should be understood as development of a new local abnormality or a systemic change in general condition of the victim, which occurs in the setting of injury, but is not directly related to the damage of the injured organ. Complications of injuries should not be confused with concomitant tissue damage in the area affected by the injurious agent. For example, if large vessels, nerves and bones are damaged in a limb injury, this situation is referred to as a concomitant injury (damage). But if the blood vessel is damaged due to displacement of a bone fragment in a bone fracture, this will be considered a complication of the fracture.

Symptoms of complications may occur:



- 1) immediately after the injury or within the first hours post-injury (symptoms of blood loss, shock and dysfunction of vital organs);
- 2) shortly after the injury (days to a week post-injury), e.g. development of an infection;
- 3) long-term after the injury and the end of injury-related treatment.

These complications arise out of chronic purulent infection, impaired tissue trophism and dysfunction of the damaged organ; they may also be iatrogenic, i. e. caused by errors in treatment of the victim.

The correctly chosen method of treatment is very important in injuries. The selection of this method is substantially informed by the type of damage, by its location and by the complications that may accompany the injury. However, there are general principles of treatment to be followed in case of an injury. These principles boil down to the following:

- 1st principle: preserve the life of the trauma victim;
- 2nd principle: preserve the damaged organ and restore its function;
- 3d principle: prevention of potential complications (both immediately and long-term after the injury).

It should be emphasized that the success of any treatment for an injury and the complete restoration of the function of damaged organs and systems greatly depend on properly organized first aid at the accident scene (i. e. on first pre-medical and medical aid).

Abdominal trauma is not uncommon in nursing practice; in these cases, it is very important to respond correctly and to refer the patient for surgical care. The arriving ambulance team must conduct a medical triage in order to:

- • detect the presence or absence of shock and bleeding and symptoms of damage to internal organs of abdominal cavity;
- • determine the urgency and the volume of medical care;
- • determine indications for medical evacuation, its sequence and type of transport.

Diagnosis of penetrating abdominal wounds is not difficult in presence of absolute signs of a penetrating wound, namely: evisceration (a rapidly developing defect in the peritoneum and in musculoaponeurotic layer of the anterior abdominal wall; as a result of the defect, there are conditions for containment failure of the abdominal cavity and externalization of viscera), leaking of intestinal juice, bile and urine. Among the patients with abdominal trauma, the proportion of such cases is only 35%.

In the rest of the patients with abdominal trauma, the diagnosis is made on the basis of relative symptoms, such as signs of ongoing intraperitoneal bleeding (noted in 60% of the injured), and local symptoms. The diagnosis of a penetrating injury to the abdomen is easier to make in case of perforating (mostly ballistic) wounds, when the comparison of the inlet and outlet wound apertures provides an idea of the course of the wound tract.

Difficulties arise in diagnosis of multiple penetrating wounds, when it is difficult or impossible to determine the trajectory of the wound tract judging by the location of the inlet and outlet apertures. It should be borne in mind that quite often (in up to 40% of penetrating abdominal wounds) the entrance wound will be located not on the abdominal wall, but in the lower abdomen, gluteal area or even upper third of the thigh.

A mandatory component to diagnosis of penetrating ballistic injuries is X-ray imaging of the abdomen in frontal and lateral projections; ultrasound imaging is also very important to diagnose the penetrating nature of ballistic injuries to the abdomen. Ultrasonography is widely used as a preoperative or even intraoperative diagnostic modality in surgical treatment of peacetime injuries.

If suspicion of the penetrating nature of the wound remains, instrumental methods of assessment are used: probing the wound with a clamp, gradual distention of the wound, laparocentesis, diagnostic peritoneal lavage, video laparoscopy and diagnostic laparotomy.

If indicated, the wound is dissected layer-wise under local anesthesia, the trajectory of the wound tract is determined and the presence of damage to parietal peritoneum is established.

Preoperative preparation depends on the general condition of the patient and the nature of the wound. The duration of preoperative infusion therapy should not exceed 1.5–2.0 hours; in the setting of continuing internal bleeding, intensive anti-shock therapy should be carried out simultaneously with performing a surgical operation for urgent indications.

Beyond doubt, preoperative assessment findings should largely guide the intraoperative search for pathologies. However, wound inspection should be complete in all cases; otherwise, serious concomitant injuries may go undetected.

This series of our study enrolled 58 patients with household trauma. We have divided patients in this series into 2 groups:

Group 1: patients with household trauma who required surgical treatment: 42 patients, which was 72% of a total of 58 patients with household trauma.

Group 2: patients with household trauma who did not require surgical treatment (these patients had only wound care, watchful waiting and drug treatment): 16 patients, which was 28% of a total of 58 patients with household trauma.

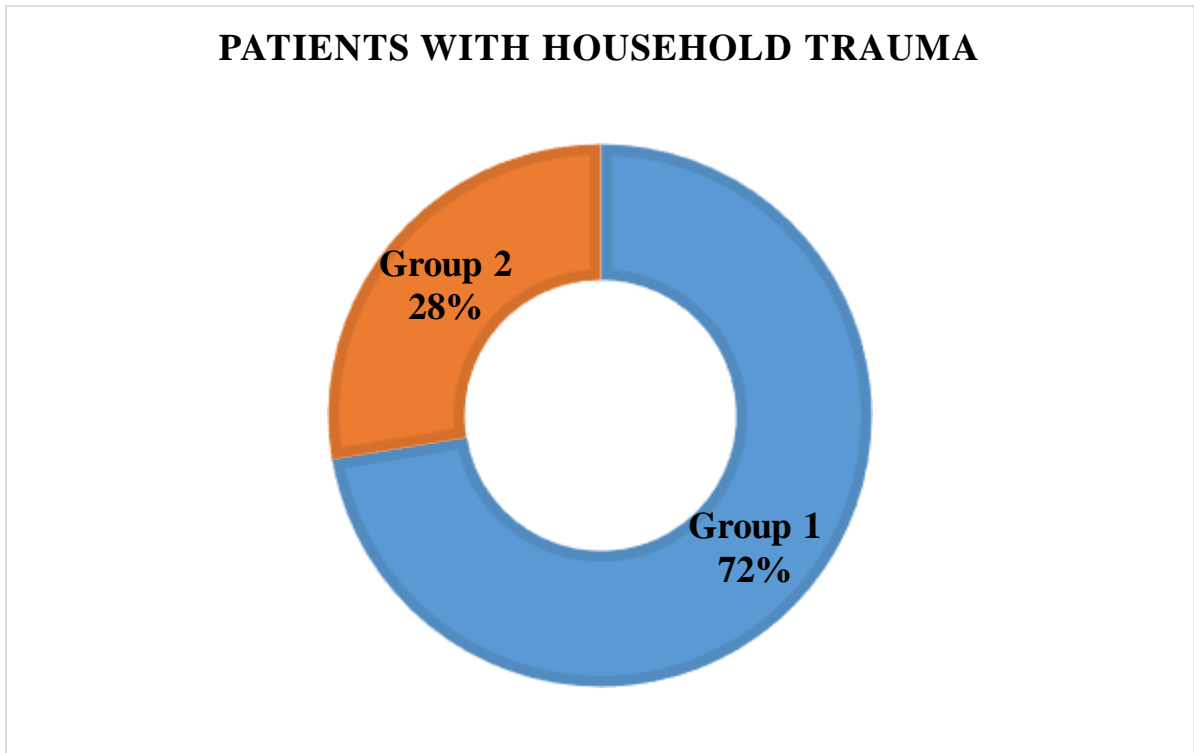


Diagram 4.1. The ratio of patients with household trauma who required emergency surgical interventions to the patients who did not require a surgical intervention.

The nurse should be aware that apart from providing emergency care to the victim(s), the health care personnel is under obligation to report the occurrence to the police when the injury is suspected to be a result of violence. In other words, if a person with a gunshot wound, stab wound or with traces of a stranglehold on their neck called on or was brought to an emergency department, the occurrence should be immediately reported to the police. Following this rule often helped solve grievous crimes. For example, during a skirmish with the police a gangster managed to escape, but was wounded. Once they seek medical care, this automatically means their detention.

## CHAPTER 5

### A STUDY OF THE NEED FOR EMERGENCY SURGICAL TREATMENT IN VICTIMS OF HOUSEHOLD ACCIDENTS AND PATIENTS WITH BALLISTIC INJURIES

Ballistic and explosive injuries are relatively rare. They usually result from gun-related accidents, violent crime, reckless handling of explosive materials, or industrial accidents. Due to the low incidence of these accidents, there is no reliable research data on these injuries.

The treatment for this class of injuries is resource-intensive and is often associated with complications. Provided certain criteria are met or the patient's condition is critical, the management of household injuries may follow the guidelines developed for surgical treatment of ballistic injuries. The treatment is focused exclusively on survival and preservation of function to minimize additional (systemic) stress on the physiology of seriously injured patients.

The specialized knowledge of the typical injuries and therapeutic priorities in victims of ballistic and household injuries is needed to enable all the personnel in the rescue chain (from first aid to primary health care institution) to act when required.

In order to determine the need for surgical treatment in patients admitted via an ambulance call, the author has investigated 96 patients with emergencies admitted over a four-month period.

The author determined the number of patients who were admitted with emergencies as a result of household trauma and ballistic injuries and divided them into the following 2 groups:

Group 1: patients in need of urgent surgical care (68 patients).

Group 2: patients with an emergency admission and in need of medical treatment (28 patients).

All patients were also divided into groups depending on the emergency problem:

- Patients with ballistic injuries (38 patients).
- Patients injured as a result of household trauma (58 patients).

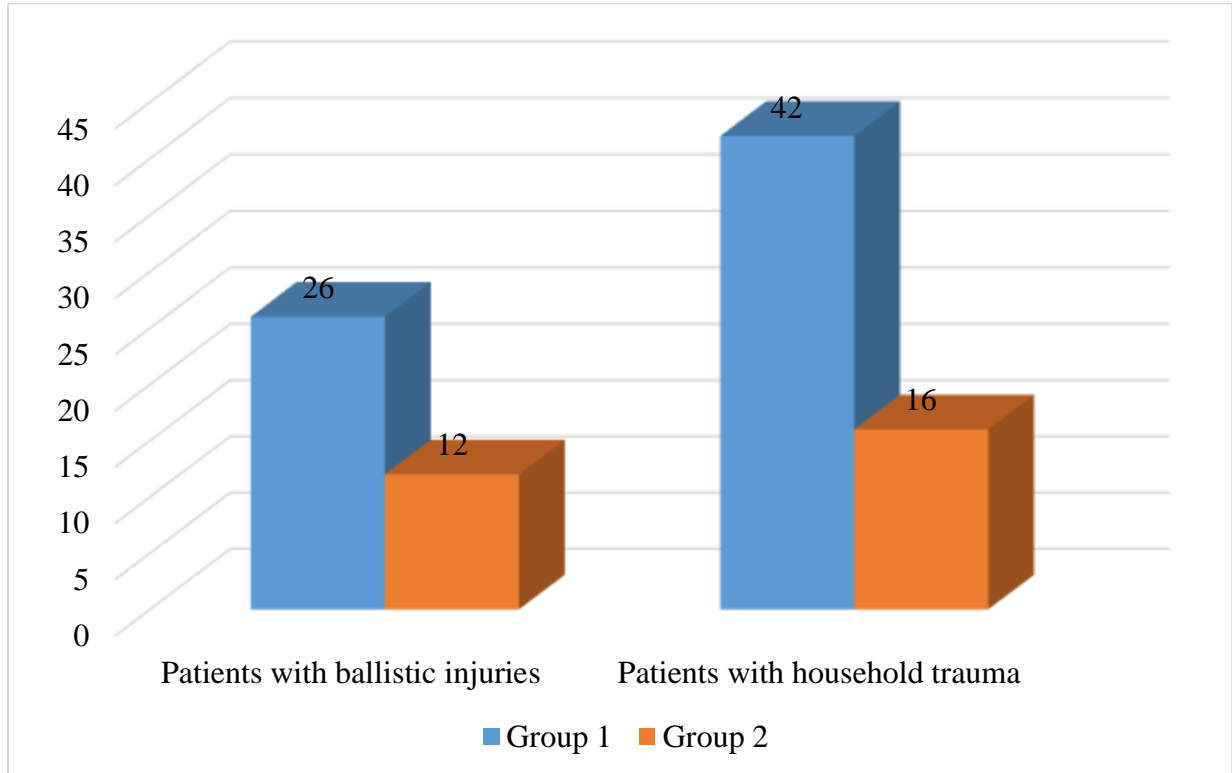


Diagram 6.1. The ratio of the number of patients with ballistic injuries and patients with household trauma who underwent emergency surgical interventions to the number of patients who did not require a surgical intervention.

Based on the data from this study, the author may posit that the majority of emergency patients with household trauma or ballistic injuries required urgent surgical operations. Therefore, a team of surgeons and medical personnel should always be available in the hospital to provide a timely emergency care for patients with various types of ballistic injuries or household trauma.

Nurses should be aware that, regardless of the type of household trauma or street injury (in particular, gunshot or stab wounds, etc.) first aid in a serious, possibly penetrating injury includes the following actions:

- Call an ambulance team;
- If blood is flowing out, the bleeding must be stopped;
- If blood is not flowing out in a gush or stream, first call an ambulance. Then determine the type of bleeding: if this is an arterial bleeding, apply a tourniquet, if this is a venous bleeding, apply a pressure bandage; if this is a capillary bleeding, apply an aseptic bandage.
- The skin around the inlet aperture should be treated with any available antiseptic solution; the outlet aperture (if present) should be treated in a similar manner.
- Put ice on top of the bandage.
- Ask the victim any question to see if they're conscious or not.
- Do not move the victim unless necessary; provide first aid in the position they are.
- If the person is wounded in the abdomen, do not give anything to eat or drink.
- Do not attempt removing a bullet, a knife or any foreign object from the wound.
- Do not attempt to push any externalized viscera back into the abdominal cavity.

Apply a compression bandage to injury site until arrival to emergency department or inspection by a surgeon.

The specific aspects of applying a compression bandage. The following rules must be followed when applying a compression bandage in a ballistic limb injury:

- Place a special dressing or a sterile napkin (not less than 4 layers of gauze or tissue) on the wound site;
- Fasten the fabric on the limb with three turns of gauze bandage;



- Use a pressure cushion, apply it from above so that it covers the edges of the wound;
- Fix the roller using a bandage, the bandage should be wrapped tightly so that the blood could stop;
- The pressure cushion should be in the form of a tight dense roller; if no pressure cushion is available, use any improvised material;

If there is a foreign object in the wound, do not apply a compression bandage until it is removed. The injured person should be placed into a body position where the limbs will be above the level of the heart.

The nurse should know the specific features of gunshot or stab wounds depending on the location of the injury.

Chest injuries are usually severe and are frequently associated with shock and life-threatening complications. Shrapnel, rebound bullets and other projectiles may cause destruction of the ribs, sternum, shoulder blades or damage the lungs and pleura. Bone fragments (splinters) may penetrate deeply into the lung tissue and cause pneumothorax and/or hemothorax.

When providing first aid in a ballistic chest injury, it is necessary to take general condition of the patient and the nature of the wound into account; a perforating (through-and-through) wound with small entry and exit apertures, as well as non-perforating wounds should not be “touched” unless there are signs of bleeding and/or pneumothorax. Such wounds need to be treated with any available antiseptic solution, then a bandage should be applied; in case of pneumothorax, the inlet and outlet apertures of the wound should be closed with a leak resistant waterproof material. If the projectile has hit the heart, the worst possible outcome is very likely. Externally, the person rapidly loses consciousness, the skin assumes a gray discoloration; it becomes clear what has happened. However, heart wounds are not always fatal.

Providing care to a person with a head wound. When a person loses consciousness as a result of a gunshot or stab wound to the head, there is no need

to bring them to consciousness; no time can be wasted on that. All efforts should be aimed at stopping the bleeding; to achieve this, the care provider will need to place a piece of sterile bandage folded in several layers on the wound and tie it tightly to the head. When bleeding from the head wound is severe, the bandage should be compressive, using a dense cushion that squeezes the soft tissues against the skull. Head injuries often result in respiratory arrest and cardiac arrest. The obvious action in such situations is cardiopulmonary resuscitation.

Gunshot or stab wounds to the spine and the neck. In spinal injury inflicted by a weapon, a short-term loss of consciousness may occur. The first aid in spinal wounds is limited to arresting the bleeding and providing the injured person with rest. It is not advisable to move the victim or to transport them to a healthcare facility independently (i. e. not by the ambulance team).

Gunshot wounds to the neck are often accompanied by damage to the larynx, as well as by damage to cervical arteries. In the event of a neck injury, the bleeding should be stopped immediately.

Sometimes there are concomitant injuries to the neck, the larynx and the cervical spine. The nursing role in these situations comes down to stopping the bleeding, providing the victim with rest and administering medications as required.

First aid in abdominal wounds. A gunshot or stab injury to the abdomen includes three pathologies:

1. Shock;
2. Bleeding;
3. Perforation (a through-and-through defect) of hollow organs (the stomach, the urinary bladder and the intestines).

If viscera have become externalized, do not attempt to push them back into the abdominal cavity; the eventration is laid over with tissue and then bandaging is performed. The important specifics of this dressing is that it should remain wet

at all times; the nurse should intermittently pour water (preferably sterile) or saline on the bandage to keep it wet. Cold compress can be applied to the wound over the bandage to relieve pain. When the bandage is fully soaked and blood begins to ooze out, the bandage cannot be removed; new rolls of bandage are applied above the initial dressing. All gunshot or stab injuries to the abdomen are considered primarily infected. Antiseptic treatment and debridement of the gunshot or stab wound should be performed during the first hours after the injury. These interventions substantially increase the odds of a favorable outcome. After receiving first aid, the victim is taken to a medical facility, where he/she is provided with qualified and specialized medical care.

## CHAPTER 6

### THE PRINCIPLES FOR WORKING WITH PATIENTS IN DANGEROUS NEIGHBORHOODS AND THE RISKS FACED BY MEDICAL PERSONNEL

Neighborhood crime may be an important social determinant of health in many urban communities with high levels of poverty. However, little is known about its relationship between neighborhood crime and access to health resources.

Neighborhood crime may have detrimental health effects that lead to the onset or exacerbation of chronic conditions, such as heart disease and hypertension. People living in communities with high crime rates are often exposed to long-term stress. It is posited that chronic stress affects health either directly (through metabolic and autonomic regulation) or indirectly (through adverse health-related behaviors such as stress-related overeating, aggressive behavior and depression).

According to a study by the US Bureau of Labor Statistics, more than 2.8 million registered nurses are working in American health care facilities. According to the Centers for Disease Control and Prevention, these clinical professionals see at least 127 million patients a year. This is physically hard work. In addition to attending daily to several patients amid a serious health crisis, the nurses are often exposed to physical dangers.

A significant number of nurses fall prey to workplace hazards. According to US Bureau of Labor Statistics, there were approximately 19,000 work-related injuries in 2015. After the accidents, these people had to take an average of nine sick days. Even after they returned to their workplace, it is likely that they had to perform their duties while in pain, which is what approximately 80 percent of nurses do, according to the American Nursing Association.

With this in mind, healthcare professionals, nurses included, should take care to implement efficacious strategies for identification and management of

serious workplace hazards in a clinical setting. Some of the most common hazards faced by the nurses and the strategies that hospitals and other healthcare facilities use for their mitigation are listed below.

Nurses are often responsible for providing care to patients who are unable to ambulate on their own. This requires a lot of physical strength and coordination. Nurses have traditionally received a clear protocol on handling these tasks, most of which are based on specialized ergonomic instructions. However, as reported in a research by Ohio State University Biodynamics Laboratory, even those nurses who faithfully practice healthy body mechanics may get injured when lifting patients. The statistical data on injuries corroborates such a situation. According to the Occupational Safety and Health Administration, about a quarter of all health worker compensation claims filed in 2011 were related to injuries sustained during patient handling procedures.

How is it possible for nurses to avoid these injuries? Ideally, hospitals should develop more advanced patient care practices that would spare professional nurses from excessive physical strain. At the first glance, this may seem like a very far-fetched and possibly expensive solution. However, the development and implementation of such initiatives is quite feasible.

The hospitals that use such programs rely on mechanical equipment to move the patients. Such equipment may include lifting tools, which allow nurses to move their patients with little physical effort. The use of such tools has dramatically reduced nursing injuries and, in turn, has reduced the costs associated with injury compensation claims.

Stanford University Medical Center in Palo Alto, California, launched a \$ 800,000 patient care program that saved more than \$ 2.2 million over five years, half of which was due to significant reductions in workplace injury compensation claims.

Nurses should be fully aware of this occupational hazard and collaborate with hospitals to develop general organizational strategies to reduce the physical burden of direct patient care.

Attacks on medical facilities in the United States are surprisingly common. Confrontations between workers, as well as conflicts initiated by patients and visitors, occur regularly and endanger the nurses. Assaults account for 9% of all workplace injuries reported in the health industry.

According to the Robert Wood Johnson Foundation, many organizations in the industry are taking steps to address this threat. Some people believe that more needs to be done.

“We need hospitals and hospital administrations to take steps now to improve the safety of their emergency departments so that patients can get the care they need,” said Anne Marie Papa, former president of the Emergency Nurses Association. “A zero-tolerance policy holds great promise for reducing violence, and we would like more hospitals to implement this policy to ensure the safety and health of patients and the people who care for them.”

In addition to supporting zero tolerance programs and workplace violence policies under state law, hospitals and other agencies can help nurses get the education they need to deal with violent people, including patients' families. The Robert Wood Johnson Foundation found that these attacks have increased in recent years. Those nursing professionals who know how to deescalate such conflicts are more likely to avoid serious injury.

Preventive measures include adequate security precautions in high-risk areas, personnel training (both during orientation and during annual training), written procedures on how to control aggressive patients, involvement of workers to the hospital committee on health and safety, as well as using litigation against the assailants.

Nurses and nursing aides/practical nurses are at great risk of contracting infections from patients, especially patients from disadvantaged neighborhoods.

Many people do drugs while neglecting to observe basic hygiene standards of handling needles. Doctors do not always have enough time to fully screen patients for diseases such as HIV or hepatitis. Therefore, every patient should be considered potentially infected.

Under such conditions, nurses and nursing aides/practical nurses should always be on guard and adhere to national and institutional safety regulations. This is especially important in surgical procedures, when healthcare personnel directly contacts with blood, which is likely to contain infection.

Serious accountability and responsibility involving human health and life and expensive resources is a significant source of stress for nurses working in emergency departments.

Until recently, an important concern in the emergency rooms included crowds of visitors. Quite frequently, patients come to the emergency room accompanied by several friends or relatives. A high workload should be performed within a limited amount of time. This situation leads to a loss in quality and accurateness of care and nursing errors, which may sometimes be lethal for the patient.

Another serious problem faced by emergency room nurses includes verbally and physically abusive patients. From the viewpoint of nurses, this is a long-standing issue and frequent conflicts are an impediment to timely and efficient care. Due to conflicts over perceived low quality of care, or due to other reasons, some patients' significant others may use verbal threats and even proceed to physical harassment, and this may become a serious obstacle to the nursing work.

Another problem that hinders the effectiveness of nurses in the emergency department is burnout. The problem of burnout has three dimensions, including fatigue, indifference, and ineffective work.

The stressful conditions in emergency care departments often lead to burnout, which is an obstacle to an effective and multifaceted care. Physical fatigue reduces the accuracy of nursing work.

The indifferent attitude of nurses due to burnout may seriously impact the efficacy and the quality of care.

Protecting nurses from injury and illness in the workplace is important to both the nurses themselves and the patients they care for. Healthy and well-rested nurses are critical to ensure vigilant observation, responsive patient care and vigorous advocacy. Many of the workplace stressors that may cause illness and injury are present in the nursing environment. These stressors include the factors associated with the immediate work context, characteristics of the organization and changes occurring beyond the organization and within the entire healthcare industry. Nurses experience significant physical and psychological challenges during the day, as well as are exposed to unfavorable labor safety conditions. Pressure within organizations to downsize staff and to use alternative nursing schedules (reserve and traveling nurses), as well as the condensing of time required for direct patient care (early discharge, heavier patient burdens) are examples of the factors that are defined at the organizational level. The external contexts of nursing practice include sparing health services management, wider implementation of complex technological innovations, ageing nursing population and increasing numbers of very ill elderly patients (ageing general population). The factors on each of these levels may pose security risks for nurses during their work hours.

The occupational hazards associated with the nursing profession may cause serious health damage both short-term and long-term.

These health implications include injuries/musculoskeletal disorders, other types of injuries, infections, mental health changes and (in the longer term) cardiovascular, metabolic and neoplastic disease.



The author has investigated into and reviewed the main results of special research studies, which connect common stressors and hazards in the workplace with individual health outcomes.

These stressors include aspects of organization of nursing work (e.g. shift work and overtime) and psychological expectations, such as having to work in a fast-paced and demanding environment.

In addition, it is important to analyze the aspects of direct care that affect the safety of nurses, including physical demands such as having to lift patients and being in uncomfortable positions, using sharps, chemical exposures in the workplace and risk for violence.

Statistical data suggests that 32% of night shift workers (i. e. working from 21-00 to 08-00 hours) and 26% alternate shift workers (with shifts routinely changing from day to night and vice versa) experienced long periods of insomnia and excessive drowsiness and could not adapt their sleep patterns to shift work.

Sleep deprivation causes daytime drowsiness. This may affect shift worker's ability to act safely and effectively both in the workplace and elsewhere. Increased sleepiness in the workplace (or reduced alertness) in shift workers has been demonstrated with both subjective reports and objective performance tests, as well as by EEG tracings showing brief episodes of involuntary sleep in the workplace. Sleepiness is most evident during the night shift, and poor daytime sleep appears to be a contributing factor. A meta-analysis of pooled injury data from multiple studies found that the risk of injury increased 18% in the afternoon/evening shift and 34% in the night shift compared to the morning/day shift. These results are consistent with the workplace observations of increased subjective sleepiness and increased reaction times during night shifts, as well as progressive reduction in overall sleep time from the early to late period of the work week.

In the workplace, nurses are exposed to thousands of chemicals and toxic substances. Hazardous chemical exposures may be present in various forms,

including aerosols, gases and contamination of skin by drugs used in nursing practice. Depending on practice locations and chemical compounds administered, exposure types may include acute and long-term chronic exposures; the main routes include pulmonary and cutaneous routes. According to a recent report, substances commonly used in healthcare settings can cause asthma or asthma attacks. This report reviews the scientific evidence of substances linked to asthma, including cleaners and disinfectants, sterilizing agents, latex, pesticides, volatile organic compounds (including formaldehyde), and pharmaceuticals. An important criterion for inclusion of substances in the report was the availability of safer alternative products or processes. The evidence comes from a variety of peer-reviewed scientific sources such as the Institute of Medicine of the National Academy of Sciences. Some of the hazardous substances currently in use are being gradually substituted by safer evidence-based alternatives.

Working as a registered nurse increases the risk for both mild and serious mental health issues; this outcome is facilitated by strenuous work.

Mild mental issues include feelings of tension, anger, anxiety, depressed mood, mental fatigue, and sleep disorders; according to various authors, they are classified as burnout, subthreshold depression, or adjustment disorders.

Mental disorders such as major depressive disorder, anxiety disorders and psychotic disorders are less common; however, they can be caused or aggravated by work-related stress.

Various types of exposure are associated with mental disease. They fall into two categories: overall allostatic load required by the nature of work, and the organization of work, including work schedule and requirements such as emotional strain when providing care to patients.

Allostatic load is a theoretical concept according to which excessive workload and constant sympathetic (adrenergic) stimulation cause structural and functional changes in the nervous, immune and cardiovascular systems, thereby

producing a detrimental effect on the processes in the body. Changes in neuronal function are associated with anxiety and depression.

Several types of psychosocial risk factors may contribute to this overall allostatic burden. High physical workloads, fast-paced work, unfavorable work schedules, role-related stressors, unsafe career paths, complicated interpersonal relationships, non-stimulating work, and lack of autonomy are associated with symptoms of anxiety and depression, some types of psychoses and substance abuse-related disorders. Some studies have even provided evidence of connections between the work-related requirements, lack of autonomy and monotony in the workplace with affective disorders and substance abuse-related disorders. Mental disorders in the workplace, depression in particular, have important implications for quality of life, cost and utilization of health care services, safety and productivity.

Emergency room personnel also face significant risks of injury due to assault by patients or their families. Individuals who carry weapons in emergency departments create the possibility of serious or fatal injury. The US states of California and Washington have adopted standards requiring safeguards for emergency department personnel. Although psychiatric and emergency departments have been in the spotlight of attention and research into this issue, no department in a healthcare facility is immune to workplace violence. Therefore, violence prevention programs will benefit all departments.

Many healthcare institutions currently require all healthcare personnel to have annual training in the management of aggressive patients, but few studies have examined the effectiveness of such training. As a result, there have been improvements in the knowledge, confidence and safety of nurses after adoption of aggressive behavior management programs. However, implementation of comprehensive violence prevention programs that go beyond staff training will improve the safety of workplaces in the healthcare industry for all workers.

These advanced programs include the use of currently available engineering and administrative controls such as security alarms, adequate staffing and training.

## CONCLUSIONS

1. The author has investigated the specific aspects of nursing process in emergency surgery.
2. The author has investigated the specific aspects of treatment in patients with ballistic injuries.
3. This work has defined the need for surgical interventions in ballistic injuries.
4. Treatment methods used in patients admitted with household trauma have been identified.
5. The author has defined the need to perform surgical procedures in patients with household trauma who required emergency care.
6. The need to perform emergency surgical interventions has been compared in patients admitted with household trauma vs the patients admitted with ballistic injuries.
7. The author has identified the risks associated with nursing work in healthcare institutions located in dangerous neighborhoods and during provision of emergency care.
8. This work has determined the principles for working with aggressive patients in dangerous neighborhoods and during provision of emergency care.

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